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Physical Sciences Learners' Understanding and Experiences of Formative Assessment in Classroom Practice

Halalisani Mngomezulu and Sam Ramaila*
University of Johannesburg
Johannesburg, South Africa

Abstract. Formative assessment has gained increasing attention in recent educational discourse due to its potential to enhance learning by providing timely and constructive feedback. However, there remains a limited understanding of how learners themselves experience and interpret formative assessment, particularly within under-resourced contexts. This qualitative study investigates the perceptions and experiences of Grade 10 Physical Sciences learners regarding formative assessment in five secondary schools located in the uMkhanyakude district. Using Bandura's Social Cognitive Theory as the guiding framework, the study purposively selected ten participants—two from each school—via random sampling. Data were collected through semi-structured focus group interviews and thematically analyzed. Findings strongly suggest that while formative assessment can motivate learners and promote self-awareness about their academic progress, inconsistent implementation and lack of clarity in feedback often hinder its effectiveness. The study highlights critical gaps in practice and recommends that educators adopt learner-centred formative assessment strategies that foster self-regulated learning and deeper content comprehension.

Keywords: Formative Assessment; Physical Sciences; Learner Understanding; Classroom Practice; Learner Experiences; Feedback

1. Introduction

Formative assessment (FA) has emerged as a crucial pedagogical approach for improving teaching and learning, particularly in subjects such as Physical Sciences, which are often perceived as difficult due to their abstract concepts and cognitive demands. Despite curriculum policies advocating for formative practices, the effective integration of FA in South African classrooms remains inconsistent and often superficial (Engelbrecht, 2020). Many science teachers

*Corresponding author: Sam Ramaila; *samr@uj.ac.za*

either lack the pedagogical tools or are not sufficiently trained to implement FA meaningfully, leading to limited learner engagement, unresolved misconceptions, and persistently low academic achievement in Physical Sciences—especially in under-resourced schools (Mdodana-Zide, 2023).

This situation is compounded by systemic challenges such as overcrowded classrooms, curriculum pacing pressures, and limited access to support materials, all of which inhibit the sustained and reflective use of formative strategies. As Panadero et al. (2018) note, FA is an iterative process through which teachers and learners receive and act on feedback to adjust instructional and learning strategies. However, in practice, many teachers revert to summative approaches due to time constraints or a narrow focus on examination preparation, leaving little room for diagnostic or developmental assessment.

The urgency of addressing these challenges is further emphasized by recent findings in the South African context. For example, Mngomezulu and Ramaila (2024) report that learners' exposure to well-implemented FA practices significantly improves academic engagement and performance, yet such practices are still not widely or effectively employed. This research problem—the misalignment between policy intent and classroom practice—warrants critical investigation, particularly from the learner's perspective, which is often underrepresented in assessment research.

In Physical Sciences, FA can take many forms, from traditional techniques like quizzes and oral questioning to more interactive methods such as peer assessment, group work, and practical demonstrations. These strategies, when effectively applied, enable teachers to continuously monitor learner progress, identify conceptual gaps, and implement timely instructional interventions. Berisha et al. (2024) argue that FA's capacity to uncover misconceptions and scaffold understanding makes it indispensable in science education.

However, without a grounded understanding of how learners experience and respond to these strategies, efforts to enhance FA implementation may remain superficial or ineffective. This study therefore seeks to address a critical gap in the literature by exploring learners lived experiences and perceptions of formative assessment in Physical Sciences classrooms. The central research question guiding the inquiry is:

How do Physical Sciences learners understand and experience formative assessment?

By investigating this question, the study aims to illuminate the nuanced ways in which FA is interpreted, experienced, and internalized by learners. The findings are expected to inform more responsive, learner-centred approaches to assessment that can drive improved teaching practice and enhanced academic outcomes in science education.

2. Literature Review

2.1 Learners' Perceptions of the Effectiveness of Formative Assessment

Formative assessment (FA) is an essential instructional method that enhances learners' competency and skills across subjects, including Physical Sciences.

Fahmi et al. (2019) emphasize that teaching is closely linked to assessment, which helps teachers understand learners' grasp of the material. Effective formative assessment supports both teachers and learners by enhancing the learning process, improving academic achievement (Fitriani et al., 2023), fostering self-regulation (Xiao & Yang, 2019), and providing teachers with valuable insights into learners' abilities. For FA to be effective in Physical Science classrooms, it must be implemented properly (Mngomezulu et al., 2024).

In typical classroom settings, teachers encounter learners with varying levels of competency and skills. Ghozali and Tyas (2022) argue that if teachers focus solely on fulfilling the syllabus without evaluating the effectiveness of their teaching on learners' understanding the learning process is incomplete. Teachers must ensure that their teaching methods positively impact all learners in the class. Morris et al. (2021) further emphasize the need for teachers to measure and analyze learners' progress through evaluation processes like formative assessment.

FA should align with the teaching process to provide continuous feedback that helps learners understand difficult topics, track their progress, and identify areas for improvement (Schneider et al., 2018; Treve, 2021; Menéndez et al., 2019). The primary goal of FA is to assess learners' abilities, attitudes, and pace of development, while promoting autonomy to solve real-life problems (Cobeña et al., 2021). Given that learners are central to the learning process, their perceptions should be considered when designing formative assessments.

Learners' responses to and perceptions of formative assessment provide teachers with a broader perspective on how well their learning activities are working. According to Ajjawi et al. (2020), feedback from learners can help teachers reflect on whether the assessment aligns with the planned learning objectives. Similarly, García-Alberti et al. (2021) found that understanding learners' perceptions of FA enables teachers to adjust their materials and teaching methods to better meet learners' needs. Wafubwa and Csíkos (2021) and Alharbi et al. (2021) suggest that designing formative assessments based on learners' perceptions allows teachers to refine their teaching practices.

Learners' ability to reflect, evaluate, and assess the quality of their own work during formative assessment activities plays a key role in their learning process. Their perceptions of different FA methods are crucial in helping teachers select tools that learners find valuable, thus reducing any biases they might have toward certain forms of assessment (Ogange et al., 2018; Hill & Edwards, 2019). Since learners are at the heart of the educational experience, understanding how they perceive their involvement in feedback practices offers valuable insights into the learning process (Mngomezulu et al., 2024). Teachers can provide feedback in various ways, including through assessment of learners' work, peer reviews, self-reflection, in-class discussions, and surveys.

Klimova et al. (2021) argue that feedback promoting personal and professional development helps learners identify their strengths and weaknesses, thereby enhancing their future performance. Constructive criticism can motivate learners to continually improve. However, Widiastuti et al. (2024) note that in some educational settings, teachers often develop formative assessments based on their own perceptions, overlooking learners' perspectives. This approach challenges

learners to make meaningful connections with their learning. When teachers focus exclusively on their own views, they risk misjudging learners' competencies and skills as the root cause of learning difficulties.

Ma (2021) highlights that teachers' limited understanding of formative assessment can lead to an overemphasis on content and memorization, undermining learners' overall achievement. Ignoring learners' perceptions of FA can result in learning gaps, as students may question the importance and fairness of the assessments, leading to discord and negative associations with the classroom experience (Syaifuddin, 2019).

Syaifuddin (2019) identifies five key aspects of learners' perceptions of formative assessment: (1) its alignment with lesson plans, (2) its authenticity and relevance to learners' experiences, (3) opportunities for counselling between learners and teachers, (4) clear communication of assessment goals and formats, and (5) equitable opportunities for all learners to complete assessment tasks.

3. Theoretical Framework

Bandura's (1997) Social Cognitive Theory (SCT) focuses on how behaviour is shaped through modelling, imitation, and observational learning. It highlights the interplay of behavioural, environmental, and cognitive factors, which is known as the triadic reciprocal causation model. In the context of this study, SCT provides a robust framework for exploring how learners' experiences with formative assessments are influenced not only by their own cognitive processes and behaviours but also by their interactions with the classroom environment and social influences (see Figure 1).

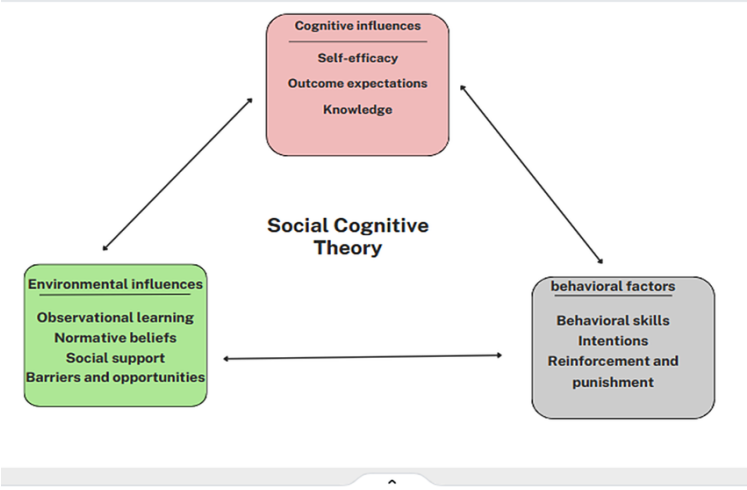

Figure 1: Model of Bandura's (1997) personal agency and triadic reciprocal causation

3.1 Environmental influences

According to SCT, learners actively shape their educational experiences by observing others, particularly peers and teachers, and imitating behaviours they perceive as effective. In the context of formative assessment, learners' reactions to feedback can be influenced by how they observe others, such as classmates or

teachers, responding to feedback (Adarkwah, 2021). If learners see their peers react positively to constructive feedback, they may be more likely to respond similarly. Conversely, if they witness feedback being ignored or misinterpreted, they may develop a less favourable attitude toward formative assessments, which could negatively affect their overall learning experience.

3.2 Cognitive influences

SCT emphasizes the importance of self-regulation, a key factor in formative assessment situations. Learners are encouraged to set personal goals, monitor their progress, and adjust their behaviour based on feedback. Formative assessments, through ongoing feedback, often serve as tools for self-regulation, helping learners assess their own learning and adjust their approach accordingly (Adarkwah, 2021). According to SCT, learners' motivation and engagement with these assessments are largely influenced by their sense of self-efficacy— their belief in their ability to succeed. Students with lower self-efficacy may view formative assessments as intimidating or discouraging, whereas those with higher self-efficacy are more likely to embrace them as valuable opportunities for growth (Li & Singh, 2022).

3.3 Environmental and behavioural influences

Another key element in the application of SCT is the environment, which encompasses the classroom setting and social interactions. Teachers play a crucial role in creating an environment where learners feel safe to take risks and make mistakes, especially by providing constructive feedback (Monteiro, Carvalho & Santos, 2021). This is essential for effective formative assessment. According to SCT, learners' attitudes and behaviours towards assessment tasks are significantly influenced by the teacher's approach to formative assessment—whether it is punitive, supportive, or encouraging. A supportive classroom atmosphere encourages learners to engage more actively in the assessment process, fostering a continuous cycle of feedback, reflection, and improvement (Monteiro, Carvalho & Santos, 2021).

3.4 The relevance of SCT to this study

SCT emphasizes the role of observational learning, self-efficacy, and social influences in shaping individuals' behaviours and experiences. In the context of this study, SCT supports the notion that learners' perceptions of formative assessment are influenced not only by their direct experiences but also by observing the reactions and attitudes of peers, teachers, and the classroom environment.

Bandura's (1997) concept of self-efficacy, which refers to an individual's belief in their ability to succeed in specific situations, plays a significant role in how learners perceive and engage with formative assessment. When learners feel confident in interpreting feedback and applying it to improve their learning, they are more likely to view formative assessment as a valuable tool for growth (Yang, Chiu & Yan, 2021).

Furthermore, SCT highlights the importance of reciprocal interactions between individuals and their environment. In this study, learners' experiences with formative assessment are shaped by both the assessment practice and the broader

classroom culture. The theory suggests that teachers, as role models, influence learners' attitudes toward formative assessment through their feedback styles and the creation of a supportive learning environment. Peer interactions within the classroom can also affect how learners approach assessment tasks and perceive their progress. Therefore, the study is grounded in the understanding that learners' responses to formative assessment are shaped by both personal factors, such as self-efficacy, and social contexts, including the influence of teachers and peers, as outlined in Bandura's (1997) SCT.

4. Research Method

In this qualitative study, the researchers adopted the ontological and epistemological assumptions of the interpretivist philosophical worldview, aiming to explore Grade 10 Physical Sciences learners' understanding and experiences of formative assessment practices within their classrooms. Recognizing that qualitative research does not predetermine sample size, the study relied on data saturation and triangulation to ensure depth, credibility, and trustworthiness. Learners were treated as key data sources, and data collection involved semi-structured focus group interviews. An interview guide was developed to ensure coherence with the research objectives and to maintain focus during the interviews. The guide included open-ended questions designed to probe learners' experiences, perceptions, and the perceived impact of formative assessment on their learning processes.

To establish the validity and reliability of the interview guide as a qualitative measuring tool, it was subjected to expert review by three specialists in science education and qualitative research methodology. Their feedback informed the refinement of the questions to ensure content validity and conceptual clarity. A pilot interview was also conducted with a group of learners not included in the main study to assess the clarity and consistency of the questions. Based on this process, necessary adjustments were made to enhance the instrument's credibility and dependability. Interviews were facilitated by the lead researcher and conducted with Grade 10 learners from five secondary schools in the UMkhanyakude District, KwaZulu-Natal, selected through purposive sampling. With informed consent, the interviews were audio-recorded and later transcribed for analysis.

Thematic analysis was employed, allowing for the identification of patterns and themes aligned with the central research question. To ensure anonymity and confidentiality, participants were assigned pseudonyms (e.g., L1 – Bayanda, L2 – Mpho). The trustworthiness of the findings was enhanced through methodical triangulation, including peer debriefing, researcher reflexivity, and member checking, thereby reinforcing the study's credibility, transferability, dependability, and confirmability.

5. Findings

This section presents the findings that emerged from the data, using verbatim quotes from participants to highlight key themes. These themes include Formative Assessment as a Tool to Motivate Learners to Take Ownership of their Learning, the Importance of Integrating Formative Assessment into Learners' Learning, and

Contributing Factors to the Success and Meaningfulness of Learners' Engagement with Formative Assessment.

Theme 1: Formative assessment as a tool to motivate learners to take ownership of their learning.

The findings suggest that when learners participate in formative assessments, they are more likely to view themselves as active contributors to their learning, rather than passive recipients of information. This engagement promotes a sense of ownership, as learners can identify specific areas of their work that require attention and make necessary adjustments. For Physical Sciences learners, the subject's practical and hands-on nature amplifies the impact of formative assessments. Learners are assessed not only on theoretical knowledge but also on their ability to apply scientific concepts in real-world contexts. These opportunities for practical application boost learners' confidence, as they can clearly see how their efforts contribute to the development of their expertise.

One learner noted:

L3-NTOKOZO

> *''I find formative assessment motivating because physical sciences are more practical, and many formative assessments boost our confidence to improve our learning in a physical science environment.''*

L6- Comfort noted that formative assessment activities not only promote critical thinking among learners but also have a positive impact on their ongoing learning. Comfort mentioned that these activities encourage them to think more deeply about the material and actively engage in the learning process:

L6-COMFORT

> *''I find the formative assessment activities motivating because they promote critical thinking, and formative assessment involves the collection of evidence about the current state of us as learners when learning and its use for influencing the ongoing teaching-learning process.''*

The sentiment expressed by L6 underscores the motivating aspect of formative assessment, highlighting its role in fostering critical thinking. Comfort further elaborated that formative assessments provide ongoing feedback, which allows both learners and teachers to assess current progress and adjust teaching methods to better support learning. Interestingly, one learner shared that formative assessment boosts their confidence, preparing them to approach examinations (summative assessments) with a positive mindset and a belief in their success.

L2-MPHO

> *'' On my side, every time I do well on my formative assessment activities. As a result, I get motivated and confident that I will pass my exams no matter what.''*

The statement from L2-Mpho emphasizes that integrating formative assessment activities not only motivates learners but also boosts their confidence, making them feel more capable of performing well in examinations, which are part of summative assessment. Findings from this theme highlight the crucial role of

formative assessment in motivating learners by providing timely feedback that helps them identify both their strengths and areas for improvement. This feedback fosters a sense of ownership over their learning process. According to Khursheed et al. (2023), formative assessments empower learners by offering clear, actionable feedback that guides their next steps in learning. Shrik (2020) argues that a continuous feedback loop encourages self-regulation, enabling learners to track their progress and set personal learning goals. As a result, learners become more engaged and proactive in addressing their learning needs, which enhances their motivation and commitment to the learning process.

Recent studies by Namaziandost et al. (2024) and Asy-Syila (2024) emphasize that formative assessment not only helps learners reflect on their academic performance but also cultivates a growth mindset, where learners view challenges as opportunities for improvement. Furthermore, Berisha et al. (2024) highlight that when formative assessment practices are integrated into regular teaching routines, they foster an active learning culture. In such a culture, learners are more likely to engage in self-assessment and peer assessment, boosting their confidence and promoting intrinsic motivation. This enables learners to see themselves as active participants in their educational journey, taking responsibility for their progress and achievements.

Theme 2: Contributing factors to the success and meaningful learners' learning
In response to the question about the factors that contribute to successful and meaningful formative assessment practices, participants shared numerous insights, all of which were surprisingly positive. For example, L2-Mpho stated:

L2-MPHO

> *''A successful and meaningful formative assessment is when you can identify gaps, get reliable feedback, and develop or improve in every formative assessment.''*

L8-Senate shared a similar sentiment, emphasizing the importance of teachers explaining concepts step-by-step to ensure that learning becomes both meaningful and effective.

L8-SENATE

> *''When the teacher explains answers step-by-step, without being too fast, the lesson becomes more meaningful and effective.''*

One participant highlighted that consistency is crucial when integrating formative assessment practices, as it contributes to more meaningful learning. For instance, L4-Maja mentioned:

L4-MAJA

''Consistency and using different forms of formative assessment contribute to a successful and meaningful experience.''

Agreeing with Maja, L5-Sanele further emphasized the importance of consistency in formative assessment activities, noting that it enables learners to solve problems independently. L5-Sanele summarized:

L5-SANELE

> *''The teacher used formative assessment activities consistently, and that taught me about their significance, contributing to my success and helping me pay attention to how questions were asked.''*

This theme examines the contributing factors to successful and meaningful learning in the context of formative assessment. According to participants' narratives, a successful formative assessment is one that helps identify knowledge gaps, provides reliable feedback, and supports continual improvement. This aligns with existing literature, which emphasizes that formative assessments are crucial for offering timely and actionable feedback, helping learners understand their strengths and weaknesses (Abdumannopovna, 2024).

Additionally, the opportunity for continuous development through repeated formative assessments enables learners to refine their learning and make meaningful progress over time. This finding highlights the importance of providing learners with a clear understanding of their current standing and the areas they need to focus on for future success.

Participants also stressed the importance of the teacher's approach in delivering effective formative assessments. They noted that when teachers break down explanations step-by-step at a manageable pace, the lesson becomes more meaningful and effective. This supports research suggesting that clear explanations and an appropriate pace enhance learners' comprehension and engagement (Carroll et al., 2021).

The use of varied and consistent formative assessment methods was also recognized as a key factor contributing to meaningful learning experiences. Research supports this by highlighting that different assessment formats, such as quizzes, peer reviews, and self-assessments, cater to diverse learning styles and provide a richer understanding of learners' progress (Yadav, 2024). Consistency in applying these methods helps foster a trustworthy and reliable learning environment that supports continuous improvement.

Theme 3: Importance of integrating formative assessment in learners' learning

In our exploration of the importance of integrating formative assessment into learners' learning, we found that most participants were able to identify learning gaps, which allowed them to adjust their approach and improve their performance on subsequent tasks.

L9-TOKELO

> *'' When the teacher repeats/twists a question from class/homework activities or in a short test, this helps me to identify if I have understood or not during a lesson.''*

From another perspective, L10- Nosipho further explained that during formative assessment practices, she makes note of difficult concepts and seeks clarification from the teacher, asking for connections between concepts. This approach helps her improve her understanding and ensures better performance during summative assessments.

L10- NOSIPHO

> *'' During the integration of formative assessment, I am able to jot down concepts that I do not understand clearly so that I could give them more attention when preparing for tests and exams and seek more clarity from my teacher''*

Interestingly, L7- Mdu praised formative assessment activities as a powerful tool for addressing learning gaps and enhancing understanding of the subject. The participants expressed that these assessments helped them identify areas for improvement and guided their learning progress.

L7- MDU

> *''I believe that formative assessment is a way for me to identify gaps in my understanding of the subject matter. Through ongoing assessment strategies such as quizzes, discussions, and assignments, formative assessment helps me improve my learning and overall comprehension of the subject.''*

The findings from this theme underscore the importance of integrating formative assessment into the learning process, as it enables learners to identify areas where they lack understanding. When teachers revisit or modify questions from class activities, homework, or short tests, learners can assess their comprehension and recognize any gaps in their knowledge (Kulasegaram et al., 2018). Formative assessments, such as quizzes, discussions, and assignments, facilitate continuous improvement by encouraging self-reflection. These ongoing assessments enable learners to pinpoint concepts that need further attention, seek clarification from teachers, and ultimately deepen their understanding of the subject matter.

6. Discussion

This study set out to explore how Grade 10 Physical Sciences learners understand and experience formative assessment within their classroom contexts. The central research question—*How do learners perceive and engage with formative assessment, and in what ways does it influence their learning?* —frames the discussion of findings. The evidence gathered through thematic analysis of focus group interviews provides critical insights into both the perceived value and practical challenges of formative assessment from the learner's perspective.

Firstly, learner motivation and ownership of learning emerged as a dominant theme. Participants consistently highlighted how regular, constructive feedback encouraged deeper engagement with content, supported self-reflection, and enabled them to track their academic growth. These findings reinforce Seli's (2019) view that formative assessment fosters self-regulation and intrinsic motivation, and they resonate with Ismail et al. (2022), who argue that formative feedback enhances learner autonomy. However, while learners appreciated the motivational role of formative feedback, they also expressed the need for clarity and consistency in its delivery—indicating that inconsistent or vague feedback could hinder rather than support progress.

Secondly, the data reveal the importance of clear learning goals and timely, actionable feedback, which learners described as vital for understanding where they stand and how to improve. These responses support Nieminen et al.'s (2021)

assertion that feedback is most effective when tightly linked to specific learning intentions. This directly addresses the research sub-question concerning the mechanisms through which formative assessment influences learners' academic behaviour. When feedback was targeted and revision opportunities were built into instructional sequences, learners reported increased confidence and academic self-efficacy—an outcome consistent with Bandura's (1997) Social Cognitive Theory, which underpins this study. According to Bandura, self-efficacy develops through mastery experiences and social reinforcement, both of which were evident in learners' feedback narratives.

Thirdly, the study examined learners' perspectives on the integration of formative assessment into daily classroom practice. Learners overwhelmingly preferred ongoing assessments over high-stakes summative evaluations, noting that continuous assessment reduced anxiety and enabled more consistent academic support. This finding responds directly to the aspect of the research question related to learner experiences. It also aligns with Moss et al. (2019), who emphasize that embedding formative assessment into everyday teaching creates a feedback-rich environment conducive to adaptive learning.

Despite the positive perceptions, the study also identified implementation gaps. Some learners noted that formative assessment practices were sporadic and depended heavily on individual teachers' initiative and capacity. This variation led to unequal learning experiences across schools and classrooms. These findings underscore the need for more structured and systemic support for teachers in using formative assessment effectively.

In summary, the discussion provides a focused response to the research question by highlighting how formative assessment, when implemented with fidelity and learner-centred principles, can significantly enhance motivation, understanding, and performance in Physical Sciences. However, the findings also reveal that without consistency, clarity, and institutional support, its full potential may not be realized. These insights have important implications for teacher professional development, curriculum planning, and assessment policy in science education.

7. Interpretation of key findings in terms of Social Cognitive Theory

The study provides key insights into how formative assessment practices are understood and experienced by learners in the context of Physical Sciences education. Drawing from Bandura's (1997) Social Cognitive Theory (SCT), the findings can be interpreted through the lens of its core principles: self-efficacy, observational learning, and reciprocal determinism, which collectively influence learners' engagement with formative assessment and their learning outcomes.

One of the significant findings from the study is that learners' understanding of formative assessment positively influences their sense of self-efficacy, a central tenet of SCT. Self-efficacy refers to an individual's belief in their ability to succeed in specific tasks or challenges. Learners who understood formative assessment as a tool for personal growth rather than just an evaluative process reported feeling more confident in their ability to learn and improve. This aligns with Bandura's assertion that self-efficacy influences the choices learners make, the effort they invest in tasks, and their perseverance when faced with challenges. In the study,

learners who perceived formative assessments as opportunities to track their progress and receive constructive feedback were more likely to engage actively in the learning process, contributing to improved academic achievement.

Another notable finding relates to the role of peer interactions in shaping learners' understanding of formative assessment. Observational learning, a key element of SCT, suggests that individuals can learn by observing others, especially when those individuals are perceived as role models or peers with similar experiences. In this study, learners reported that observing peers' experiences with formative assessments—whether through peer feedback or group discussions—helped them better understand the purpose and benefits of these assessments. By witnessing their peers succeed or struggle with formative assessments, learners were able to adjust their own approaches and attitudes towards the assessment process. This mirrors Bandura's view that learning is not only a direct personal experience but also an outcome of social interactions and the observation of others in the learning environment.

The concept of reciprocal determinism, another cornerstone of SCT, posits that individuals, their behaviours, and the environment interact and influence each other in a dynamic process. In the context of the study, learners' experiences with formative assessment were not only shaped by their own beliefs and actions but also by the classroom environment and teacher practices. The study found that when teachers provided clear explanations of formative assessment strategies, created an open and supportive atmosphere for feedback, and encouraged self-reflection, learners were more likely to embrace formative assessment practices positively. At the same time, learners' attitudes and behaviours influenced the classroom environment by fostering a culture of continuous improvement. This reciprocal interaction between the learner, the teacher, and the learning environment highlights the dynamic nature of formative assessment practices as shaped by multiple factors within the classroom.

The emotional responses learners had toward formative assessment were also central to their overall experiences and understanding. According to SCT, emotional reactions can impact an individual's motivation and behaviour. The study revealed that learners who felt anxiety or fear towards assessments, particularly those who did not understand the purpose of formative assessment, experienced lower motivation to engage with the assessment process. Conversely, learners who experienced positive emotions such as satisfaction and pride from receiving constructive feedback were more motivated to use the feedback for improvement, demonstrating a heightened intrinsic motivation to learn. This underscores the importance of creating an emotionally supportive classroom environment, where formative assessment is seen as a tool for growth rather than a source of stress.

The study also highlighted the importance of teacher-student interactions in facilitating learners' understanding of formative assessment. Learners who felt supported by their teachers were more likely to perceive formative assessment as a beneficial process. According to Bandura, social support plays a crucial role in shaping individuals' behaviour and their self-regulation. When teachers provided timely and constructive feedback, learners felt empowered and capable of

improving their academic performance. This social support, along with a positive feedback loop of continuous learning and adaptation, demonstrated the reciprocal relationship between the teacher, learner, and the learning environment.

The findings from the study can be interpreted through Bandura's Social Cognitive Theory, emphasizing the interconnected roles of self-efficacy, observational learning, and reciprocal determinism in shaping learners' experiences with formative assessment. Learners' perceptions of formative assessment as a tool for self-improvement and their engagement with peers and teachers significantly influenced their academic performance. The study suggests that teachers can enhance the effectiveness of formative assessments by fostering a supportive environment that promotes learner self-efficacy, encourages observational learning through peer interactions, and creates a dynamic, reciprocal classroom environment. These findings not only align with the core principles of SCT but also provide practical insights for enhancing formative assessment practices in the Physical Sciences classroom.

7. Recommendations

Based on the findings of this study, several recommendations can be made to further enhance the effectiveness of formative assessment practices in fostering learner motivation and promoting meaningful learning. To maximize the impact of formative assessment, it is crucial for teachers to establish and communicate clear learning objectives. These objectives guide learners in understanding what is expected of them and provide a roadmap for both learners and educators to gauge progress. Teachers should ensure that these objectives are shared with learners at the beginning of the lesson or unit and revisited throughout the learning process to maintain focus and direction.

The study highlighted the importance of timely and specific feedback in promoting meaningful learning. It is recommended that teachers provide feedback promptly after formative assessments, ensuring that learners have ample time to reflect on their performance and make necessary adjustments. Feedback should be constructive, actionable, and aligned with the learning objectives to ensure that learners can clearly understand what they need to improve and how to do so. Additionally, teachers should encourage a two-way dialogue with learners, allowing them to ask questions and seek further clarification if needed.

Learners emphasized the significance of having opportunities for reflection as part of the formative assessment process. Educators should integrate structured reflection activities that encourage learners to assess their own progress, identify strengths and weaknesses, and set personal learning goals. By fostering a reflective mindset, teachers can help learners take ownership of their learning and cultivate intrinsic motivation, as they are encouraged to take an active role in their own educational journey.

In line with the preferences expressed by learners, this study advocates for the integration of continuous assessment as part of everyday classroom practices. Continuous assessment provides learners with ongoing feedback on their academic progress, helping to alleviate the pressure of high stakes testing. This

approach enables both learners and teachers to monitor progress over time and make timely adjustments to teaching and learning strategies. Educators should consider utilizing a variety of formative assessment methods, such as quizzes, discussions, peer assessments, and self-assessments, to provide a comprehensive view of learners' understanding and development.

The study suggests that formative assessments can help learners develop a growth mindset by encouraging them to view challenges as opportunities for improvement. Teachers should foster an environment that promotes this mindset, emphasizing that mistakes and setbacks are a natural part of the learning process. By creating a safe space for learners to take risks and learn from their errors, educators can help build resilience and self-confidence, ultimately enhancing motivation and academic performance.

To ensure that formative assessment is effectively implemented, ongoing professional development for teachers is recommended. Teachers should be trained in best practices for providing constructive feedback, setting clear learning objectives, and integrating formative assessments into their daily teaching routines. Professional development opportunities should also focus on how to use formative assessments to support learner autonomy and self-regulation, empowering educators to become facilitators of meaningful learning experiences.

Given the growing role of technology in education, it is recommended that formative assessment practices incorporate digital tools to enhance feedback and engagement. Technology can provide learners with instant feedback, track their progress, and allow for more interactive and personalized assessments. Tools such as online quizzes, e-portfolios, and learning management systems can help streamline the formative assessment process and make it more accessible for both learners and teachers.

By implementing these recommendations, educators can enhance the effectiveness of formative assessment practices, promote learner autonomy, and foster meaningful learning experiences. This approach will not only support learners in their academic development but also contribute to the creation of a more dynamic and responsive educational environment that encourages continuous improvement and growth.

8. Conclusion

This study has provided valuable insights into how Grade 10 Physical Sciences learners perceive and experience formative assessment within under-resourced classroom settings in the uMkhanyakude district. Guided by Bandura's Social Cognitive Theory, the findings reveal that formative assessment can play a vital role in motivating learners, fostering self-awareness, and promoting self-regulated learning. Learners benefit from timely, specific, and actionable feedback that helps them identify strengths and areas for improvement, thereby enhancing their academic confidence and engagement.

However, the study also highlights significant challenges related to inconsistent implementation, unclear feedback, and contextual constraints such as large class sizes and limited teacher training. These issues impede the full potential of formative assessment to support meaningful learning and academic success. The

variability in formative assessment practices across schools suggests the need for more structured support and professional development to equip educators with effective strategies tailored to learners' needs.

Ultimately, this research underscores the importance of adopting learner-centred formative assessment approaches that not only provide constructive feedback but also actively involve learners in their own learning journeys. By aligning formative assessment with clear learning goals and fostering a supportive classroom environment, teachers can enhance learners' understanding, motivation, and performance in Physical Sciences. These findings contribute to ongoing efforts to bridge the gap between policy and practice, especially in contexts where resource limitations pose significant barriers. Future research could expand this inquiry to include teachers' perspectives and explore scalable interventions aimed at strengthening formative assessment practices across diverse educational settings.

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